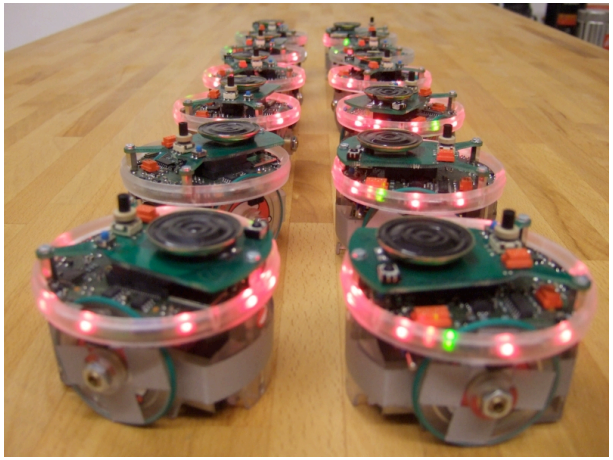
Dancing Robots

Studio: Dancing robots



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Abstract
Robots have a long history as a tangible platform through which designers and artists can explore human and social experiences. From Pierre Jaquet-Doz's Automatons from the Eighteenth Century, to Dunne & Raby's technological dreams of non-anthropomorphic robots that assist our lives [1], robots have been a rich form of technology that artists and designers have used to explore the human condition and how we relate to technology. This studio will give an introduction to small programmable robots and participants will learn how to use them to develop collaborative performances. Following an introduction, participants will be given the choice to work with bespoke robots (arduino based) or an e-puck [2] robot, participants will work in small groups to develop behaviours that, infer a form of robot dance. For a dance based upon a twitter feed or perform a collective task that assists a human. The studio will culminate in a series of performances by the bots that explore the potential for robots as materials for designing with data.

Keywords
Robots, e-pucks, swarm, design informatics.

ACM Classification Keywords
H5.2 User Interfaces: Interaction Styles.

Introduction

Robots are an accessible way of allowing designers to engage with a technology that can be programmed to perform physical actions. Often portrayed in science fiction as human counterparts robots offer an interesting way to help designers think about solving domestic or industrial problems using adaptable systems that involve physical movement. Becoming smaller and cheaper, with a wide range of on-board technology and programmable interfaces, robots can be applied to even more challenging scenarios. Open hardware platforms such as the e-puck, allow quick tangible experimentation, and are a useful tool to explore scenarios for robotic applications.

Studio Proposal

The studio will begin with a short inspiration lecture that will introduce the experiences of the authors and frame the value of using robots as a design platform. The team will draw attention to the interaction design solutions developed for the UK Research Council project 'The Time of Encounter' [3] involving different explorations of temporal experience, by means of traditional design and the use of a collection of robots that re-enacted school children's experience of time passing. By comparing the two interaction design outcomes, the authors will articulate their interest in the role of the robot in the learning experience of the children. Including how the use of robots exhibited behaviours that were seen as an extension of the children who programmed them. This anthropomorphic dimension is a valuable characteristic of robots that offers the designer a different modality for solving problems or for the development of artworks that allow the user to reflect upon individual or social experiences. The authors will proceed to introduce research and teaching methods at the University of Edinburgh that extend this principle and offers designers robots as platforms for exploring different scenarios.

figure 1. Pupils and staff at Holmewood School, London watching robots 'perform' their personal experiences of time.

Having established the role of robots within interaction design the authors will introduce the Time Bot robots developed during for The Time of Encounter project and the e-puck platform. e-puck's are mini mobile robots that were developed at the Swiss Federal Institute of Technology in Lausanne (EPFL) for teaching purposes. e-pucks are powered by a dsPIC microcontroller and feature a large number of sensors in their basic configuration, including: 8 TCRT1000 optical sensors (infrared proximity and light), a color camera, 640x480px, a 3D accelerometer and 3 microphones. It also includes a loudspeaker, 10 feedback LEDs, 8 KB RAM and 144 KB Flash memory. The e-puck hardware and software is open source and provides low-level

access to every electronic device and offering many extension possibilities.

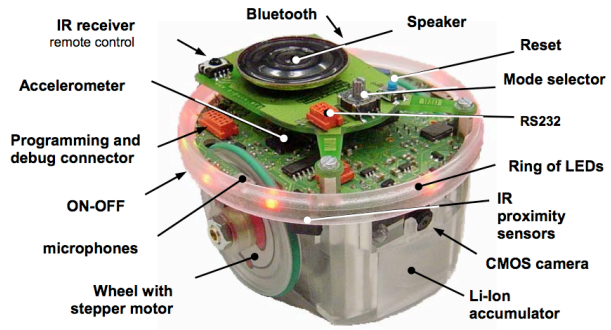

figure 2. e-puck with onboard technologies.

Examples of e-pucks being used for particular teaching and research projects will demonstrate their technical capabilities but more importantly articulate their ability to work cooperatively to perform collective tasks and roles.

Following the overview of the robot, participants will watch pairs of e-puck's perform a pre-programmed activity developed by the authors and derived from the Time of the Encounter project. At this point the introduction to the studio will be complete and we will enter an applied workshop mode to support participants in the development of dancing robots. Working in small groups participants will be guided through the tutorial and achieve a response from a robot.

Following this basic interaction the authors will then introduce the design proposal. This proposal will return participants to the conceptual driver for the studio – how might designers use robots to solve problems or develop artworks that allow people to reflect upon individual or social experiences?

Having had time to consider some simple responses to the design proposal the studio will proceed in an open format in which participants will be supported and guided by the authors to achieve their aims. A collection of e-pucks as well as the Time Bots will be available for testing although most of the work will take place on PC laptops equipped with the relevant software. Participants will need to bring their own laptops unless these are provided by the conference.

The studio is intended to be as accessible as possible for any designer to take part. This could include individuals and groups working on a purely conceptual solution based upon observation of the robots.

Final phase of the studio will consist of presentations by teams that articulate the conceptual response to the design proposal and how robots might be used as a design medium. Robot performances will support the presentations. In some cases however, the e-pucks may only perform a small aspect of the conceptual response depending upon each individual concept and the technical progress of each team.

Studio Topics to be covered

The studio will cover the following topics:

1. Discussion on the role of robots within design education.

2. A technical introduction to e-puck and Time Bot robots, their specifications and applications.

3. A demonstration how robots can be 'designed' to perform tasks or manifest social experiences.

4. A guided session in how to program an e-puck and Time Bot.

5. Developing solutions to the design proposal.

6. Presenting and reflecting upon the opportunities and challenges of using robots as a design platform within design education.

Studio Learning Goals

In addition to developing specific skills in programming robots, the studio will challenge the current perception of robots as a design platform within design education. At present robots are considered as a discrete form of technology rather than as a platform for developing design solutions. Early indicators across the teaching and research projects developed by the authors suggest that acknowledging the human and social characteristics of robots changes the design space and supports a sensitive platform for exploring how problems may be solved that engage users by extending their self of self or community.

Through the different phases of the studio we expect participants to engage with the critical approach to re-evaluating the affordances of robots both in individual form and in collectives, and differentiate them from interaction design systems that do not adopt anthropomorphic characteristics.

Through the design proposal we expect participants to apply design thinking to develop a wide range of conceptual design applications for robots and to manifest some or all of these practices in a robot performance.

We expect that the same performance will support a shared discussion to illicit practical and theoretical insights into the role of robots within design education and practice. The authors expect that the same discussions will provide a shared insight into how robots play a specific role in the development of Tangible Embedded and Embodied Interfaces that are able to engage users through an extension of human and social experiences.

Studio Supporting Web Documents

The studio will develop its own web documents specific to the TEI14 session but will draw upon existing materials made available at the following URLs:

http://www.e-puck.org/index.php?option=com_phocadownload&view=file&id=16:btboot-epuck-gettingstarted&Itemid=38

http://www.gctronic.com/files/miniDocWeb.pdf

http://www.cyberbotics.com/dvd/common/doc/webots/guide/section8.1.html

References

[1] http://www.dunneandraby.co.uk/content/projects/10/

[2] http://www.e-puck.org

[3] http://www.timeofencounter.org